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DOI: https://doi.org/10.1016/j.tate.2020.103252

Teaching and Teacher Education 99 (2021) 103252

Contents lists available at ScienceDirect

Teaching and Teacher Education

journal homepage: www.elsevier.com/locate/tate

Research paper

Situational fluctuations in student teachers' self-efficacy and its relation to perceived teaching experiences and cooperating teachers' discourse elements during the teaching practicum☆

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HIGHLIGHTS

- Longitudinal analysis of student teachers' state self-efficacy (state STSE).
- State STSE increased over the course of a three-week teaching practicum.
- State STSE fluctuated considerably from lesson to lesson.
- Mastery experiences are relevant for state STSE.
- Student teacher orientation in lesson conferences is relevant for state STSE.

ARTICLE INFO

Article history:
Received 23 March 2020
Received in revised form
12 October 2020
Accepted 26 November 2020
Available online 15 December 2020

Keywords:
Teacher education
Student teachers' sate self-efficacy
Intra-individual variability
Cooperating teachers
Lesson conferences

ABSTRACT

This study examined situational fluctuations in student teachers' ($N = 120$) development in self-efficacy during a three-week teaching practicum in Switzerland. Situational measurements (state) were assessed during a six-lesson teaching unit on written argumentation. Results showed that student teachers' intra-individual state self-efficacy increased during the practicum. However, multilevel regression models indicated that student teachers' state self-efficacy fluctuated considerably during the teaching unit with approximately 30% of variance being located at the lesson level. This variation was predicted by mastery experiences (i.e., experience of competence and instructional quality) and cooperating teachers' discourse elements in lesson conferences (i.e., co-constructive planning, student teacher orientation).

The teaching practicum is a pivotal component in student teachers' professional development (Korthagen, 2010). It also represents an important phase in the development of teacher self-efficacy (TSE; Flores, 2015; Gorski, Davis, & Reiter, 2012; Mulholland & Wallace, 2001). Some earlier studies on changes in student teachers' self-efficacy (STSE) have found that STSE tends to increase during the teaching practicum (Fives, Hamman, & Olivarez, 2007; Klassen & Durksen, 2014; Woolfolk Hoy & Burke Spero, 2005), however, there is also evidence for no or even negative changes in STSE (Brouwers & Tomic, 2000). In addition to these inconclusive results, most of these previous studies were limited in scope, as they only used assessments of STSE based on retrospective self-reports before and after the teaching practicum (Klassen & Durksen, 2014; Malmberg, Hagger, & Webster, 2014). With this methodology, it is not possible to adequately assess fluctuations in STSE during such a developmental phase. The present study seeks to address this research gap by examining the intra-individual development of "state" STSE using multiple assessments during a three-week teaching practicum. Hence, the study focuses on fluctuations in student teachers' state STSE from lesson to lesson. Additionally, this study examines factors that might explain the intra-individual variability of state STSE during a teaching practicum (e.g. perceived teaching experiences and collaborating with the cooperating teacher in lesson conferences).

Generally, self-efficacy is influenced by mastery experiences, vicarious experiences, verbal persuasion and emotional arousal

☆ This work was supported by the Swiss National Science Foundation (SNF) [grant number 100019L_159505] and the German Research Foundation [grant number 275350288].
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https://doi.org/10.1016/j.tate.2020.103252

(Bandura, 1977). Mastery experiences, that is the perception that a teaching performance has been successful, strengthen efficacy beliefs, which increases the confidence that future teaching performance will be successful (Tschannen-Moran, Hoy, & Hoy, 1998) Mastery experiences have been identified as the strongest source for in-service TSE development (Tschannen-Moran & McMaster, 2009). Another important source for STSE development in the teaching practicum is verbal persuasion (Tschannen-Moran & Hoy, 2007). Verbal persuasion can be given, for example, by cooperating teachers[1] in lesson conferences. However, within lesson conferences cooperating teachers' actions are usually not limited to "pep talks" (Tschannen-Moran et al., 1998) but extend to offers of support and criticism regarding student teachers planning and reflecting on their teaching performance (Pitton, 2006; Staub, 2004). Therefore, the present study includes several discourse elements in lesson conferences with a cooperating teacher in addition to student teacher's teaching experiences as possible situation-related factors of state STSE (from lesson to lesson). The results can provide insight into micro-processes of the development of state STSE during the teaching practicum.

1. Teacher Self-efficacy (TSE)

TSE is a domain-specific form of self-efficacy. It refers to a teacher's belief in the abilities that are required in the teaching profession and can be defined as the teacher's *"judgment about his ability to achieve the desired results of students' engagement and learning, even among students who may be difficult or unmotivated"* (Tschannen-Moran & Hoy, 2001, p. 783). Teachers' sense of efficacy affects the effort they invest in teaching, the goals they set for themselves and their aspirations. Previous studies with in-service teachers have shown that TSE is positively linked to various educational outcomes such as teacher engagement and instructional behavior (Dicke et al., 2014; Holzberger, Philipp, & Kunter, 2013; Rodríguez et al., 2014; Schwarzer & Warner, 2014). For instance, Schwarzer and Warner (2014) found positive relations between TSE and teaching behavior, specifically in-service teachers with high TSE showed a higher student orientation, reacted more strongly to students' problems, used more innovative and active forms of teaching and reported a stronger integrative attitude. Given these empirical findings, a high TSE is generally desirable and can further be considered as a central presupposition for competent self- and action regulation (Luszczynska, Gutiérrez-Doña, & Schwarzer, 2005; Pajares, 2002), which in turn contributes significantly to teaching effectiveness.

Previous research has further shown that TSE varies in different situations since it refers to the belief in one's ability to perform a certain teaching task in a certain situation at a certain performance level (e.g., Gardner & Pierce, 1998; Malmberg et al., 2014; Poulou, 2007). Considering the contextually and behaviorally specific requirements (e.g., subject to teach, introducing a new topic, or planning an exam) that are inherent to each teaching situation, TSE refers to a combined analysis of the assessment of personal teaching competence or ability, the specific teaching task and the teaching behavior to be displayed. Hence, following Dellinger, Bobbett, Olivier, and Ellett (2008) TSE beliefs can vary in their strength (the intensity of a person's belief in their ability to do a certain task), level (perceived degree of difficulty of the task) and generality (the degree to which efficacy beliefs about one task generalize across a range of similar activities in the same or in another domain). As a consequence, in school contexts, TSE can be more precisely defined as "*teachers' individual beliefs in their capabilities to perform specific teaching tasks at a specific level of quality in a specified situation*" (Dellinger et al., 2008, p. 752, p. 752).

2. Student teacher self-efficacy (STSE) – A "state" perspective

Generally, the teaching practicum can be considered as a developmental phase in which student teachers develop both new and existing teaching skills and knowledge in the classroom (e.g., Klassen & Durksen, 2014; Pendergast, Garvis, & Keogh, 2011). These task- and situation-related challenges require student teachers to continuously analyze the task to be performed and (re)assess their ability and competence in relation to the task. For this reason, it can be assumed that STSE is not stable during the teaching practicum (e.g., Steyer, Schmitt, & Eid, 1999; Yeo & Neal, 2006). These possible fluctuations can be captured by "state" assessments: Traditional questionnaires for (S)TSE (e.g., Schwarzer & Hallum, 2008) are characterized by (student) teachers' reporting their global overall teaching experiences (i.e., before and after the teaching practicum). However, such measures of (S)TSE widely ignore the context in which (student) teachers must perform because the conditions are not specified in detail (Chesnut & Burley, 2015). Therefore, these measures refer to an aggregation of multiple teaching experiences, which is then a general assessment of (S)TSE (Bandura, 1997). On the contrary, state questionnaires refer to real time experiences (i.e., immediately after a specific lesson taught) over several measurement points across a given timespan (Conner & Barrett, 2012), such as over the course of a teaching practicum. Thus, state assessments represent contextually and behaviorally specific (S)TSE measures (Schmitz, 2006) that refer to a particular teaching situation under specific circumstances (i.e., actual class composition and the task involved). Therefore, a state assessment is the most specific measure of perceived (S)TSE (Bandura, 1997). To be specific, we define state STSE as lesson-specific thoughts generated by a student teacher about their ability to teach a specific topic within a specific classroom setting (see Schmitz & Wiese, 2006 for a similar definition for state self-efficacy beliefs in civil engineering students at a German university). Thus, it should be assessed immediately after the taught lesson.

3. Intra-individual variability in state (S)TSE

Repeated measures in state STSE during the teaching practicum enable an examination of intra-individual variability in self-efficacy beliefs and possible antecedents of this variability (e.g., Malmberg, 2018). This may promote the understanding of changes in (S)TSE in a developmental phase. Several studies in the 1990s (e.g., Raudenbush, Rowan, & Cheong, 1992; Ross, Cousins, & Gadalla, 1996) investigated and documented the intra-individual variability of in-service teachers' TSE associated with situational factors. However, in these studies intra-individual variability was only investigated at the person and class level and not at the lesson level.

A recent experience-sampling study by Malmberg et al. (2014) has shown that there is a considerable amount of variance in TSE that is attributable to the specific teaching lessons. In Malmbergs' study, in addition to assessing TSE in learning support and classroom management at the person level (teacher), possible factors influencing the specificity were examined both at the class level and at the lesson level. The class level included different class characteristics such as gender distribution or average student performance. The lesson level involved the teaching activity they were performing at the time of the survey (i.e., introduction of a

[1] In other studies, various other terms have been used to designate cooperating teachers, such as associate teachers, mentor teachers or supervising teachers (see Becker, Waldis, & Staub, 2019). In this study, cooperating teachers are school-based teachers who assist student teachers during their field experiences (see Hoffman et al., 2015).

new topic, consolidation, repetition, examination or other) or how they perceived the students' engagement and behavior in the specific situation. They found lower variance between teachers (learning support = 19%, class management = 30%) than within teachers (learning support = 81%, class management = 70%) with the highest proportion of variance being attributed to the lesson level (learning support = 58%, class management = 49%). At the lesson level, the perceived commitment and behavior of the pupils taught proved to be the most important factors influencing the intra-individual variability of TSE. Results from their study support a differentiation between person and situation-related effects (i.e., lesson) with regard to TSE. It is therefore important to take into account intra-individual variations within teachers and between lessons, especially for student teachers as their TSE is still developing.

The results regarding the intra-individual variability in in-service teachers' TSE support the need to move beyond assessing inter-individual differences in (S)TSE through pre-post designs since teachers are exposed to different teaching situations that individually affect their momentary (state) beliefs in their self-efficacy. By employing research designs with multiple measurements, the study of STSE can be investigated with respect to the intra-individual fluctuations from lesson to lesson. Additionally, multiple repeated measurements enable a distinction between the variance components that can be attributed to the situation (variability within student teachers) and to the person (variability between student teachers), which allows the situation specificity of state STSE to be analyzed (Zee, Koomen, Jellesma, Geerlings, & de Jong, 2016). To date, however, no studies have been conducted that investigated the intra-individual variability, and thus the situation-specificity of state STSE during the teaching practicum. Since the teaching practicum is a developmental phase, it is of further interest to analyze the relationship between this variation in state STSE and situation-related factors. This will enable a better understanding of the possible sources that positively or negatively affect state STSE during the teaching practicum.

4. Sources of (S)TSE

According to Bandura (1997) mastery experience, vicarious experience, verbal persuasion and emotional arousal contribute to the development of self-efficacy. During the teaching practicum, activities that could be regarded as contributing to the development of STSE are teaching experiences (e.g., Tschannen-Moran & Hoy, 2007; Wolters & Daugherty, 2007), job shadowing (e.g., Wagler, 2011), feedback from cooperating teachers (e.g., Klassen & Durksen, 2014; Moulding, Stewart, & Dunmeyer, 2014) and emotional experiences during the teaching practicum (e.g., Poulou, 2007; Tschannen-Moran & Hoy, 2007). Since all participating student teachers were asked to teach a unit of six lessons and were supported during that time by a cooperating teacher, this study focused on perceived successful teaching experiences (as an indicator of mastery experiences) and cooperating teachers' discourse elements in lesson conferences (which includes elements of verbal persuasion). Hence, below we describe teaching experiences and discourse elements in lesson conferences in the context of a teaching practicum in more detail.

Teaching experiences. The perception of a successful teaching experience can be described as a mastery experience, which is considered to be the most reliable, and thus the strongest source for the attainment and strengthening of personal self-efficacy beliefs (Bandura, 1977; Usher & Pajares, 2008). This is because mastery experiences are based on authentic experiences regardless of if one's abilities have led to the desired result or if an action has been successful. If one's own efforts during a mastery experience are considered as successful then future aspirations are likely to be positive. An intervention study has in fact identified mastery experiences as the most important source for in-service teachers' TSE (Tschannen-Moran & McMaster, 2009). However, Bandura (1997) states that student teachers may have difficulty classifying their teaching experiences due to a lack of knowledge and teaching experience. Hence, student teachers' mastery experiences are not necessarily a reliable source as they may not correspond to the actual quality of performance (student teachers may over- or underestimate their abilities). For the development of (S)TSE other sources such as cooperating teachers helping student teachers understand and question their teaching experiences through discourses could play an equally important role.

Discourse elements in lesson conferences. During the teaching practicum student teachers in many countries work closely with a school-based cooperating teacher (e.g., Hoffman et al., 2015), for example in lesson conferences. This relationship is usually more reciprocal than working with a university supervisor (Ambrosetti, Knight, & Dekkers, 2014) and student teachers wish to receive instructional and emotional support from cooperating teachers (see e.g., Davis & Fantozzi, 2016). Hence, cooperating teachers' tasks involve providing encouragement and teaching-related support during lesson conferences; thus, cooperating teachers may provide verbal persuasion to student teachers during their discourses. According to Bandura (1997), verbal persuasion refers to verbal efforts (such as feedback) directed at supporting a person's sense of competence or confidence in his/her ability to succeed in a particular situation. Following Tschannen-Moran et al. (1998), teachers can receive verbal persuasion from supervisors, other teachers and even students, and this verbal persuasion may inform teachers' perceptions of their teaching competence as well as offer encouragement and strategies for overcoming occasional setbacks and situational demands in the future. Previous studies have shown a positive association between verbal persuasion and STSE during the teaching practicum (Klassen & Durksen, 2014; Mulholland & Wallace, 2001; Pfitzner-Eden, 2016).

However, verbal persuasion has to correspond to the (student) teachers' skill level and general feedback, such as "you can do it" when skills are lacking, might be counterproductive. Hence, during the teaching practicum cooperating teachers should support student teachers in ways that help them imagine how they can and will be successful (e.g., by planning together or answering student teacher's questions). Cooperating teachers, however, are often in conflicting roles as they are asked to offer support but also fulfill evaluative tasks, that is they also provide (critical) feedback to student teachers about their teaching performance (Hoffman et al., 2015). Discourses between cooperating teachers and student teachers in lesson conferences therefore usually involve more than verbal persuasion.

Previous research suggests, that there are various discourse elements that may have an impact on student teachers' efficacy beliefs. For instance, an empirical study has shown that co-constructive collaboration in lesson conferences (i.e., interactively structured lesson conferences which focus on lesson planning, lesson implementation, and problematizing of teaching-related aspects that leads to a mutual responsibility) is positively related to student teachers' competency gains in lesson planning, classroom management and pupils' engagement in class (Staub, Waldis, Futter, & Schatzmann, 2014). In addition, previous research suggests that the extent to which the topics of the verbal interaction are introduced by the cooperating teacher or the student teacher is another important discourse element (Crasborn, Hennissen, Brouwer, Korthagen, & Bergen, 2011). Specifically, more learning occurs during lesson conferences in which the cooperating teacher allows student teachers to initiate which issues to be discussed

(Futter & Staub, 2017). Considering that a persuasive message should be matched to the individual's needs (Schunk & Usher, 2019), student teachers should be able to actively contribute to their professional development of state STSE by formulating and introducing their own questions and learning needs in lesson conferences. Thus, in addition to teaching experiences (i.e., mastery experiences), discourse elements in lesson conferences such as co-constructive collaboration and student teacher orientation can be regarded as situation-related factors that may affect student teachers' state STSE during the teaching practicum.

5. The present study

The first aim of this study was to investigate the intra-individual variability of state STSE during the teaching practicum in order to consider situation-related fluctuations of state STSE from lesson to lesson. As mastery experiences might not be a strong reliable source for student teachers (as compared to in-service teachers), this study focused additionally on co-constructive and student teacher-oriented discourse elements between student teachers and cooperating teachers in lesson conferences. More specifically, the present study addressed the following three research questions: (1) How does state STSE change over the course of the teaching practicum (*change in student teachers' state self-efficacy*)? (2) How strongly does state STSE fluctuate during the teaching practicum within student teachers (*student teachers' intra-individual variability in their state self-efficacy*)? To what degree is state STSE person- and situation-specific? (3) What situation-specific factors relate to student teachers' momentary lesson-related state STSE? Do mastery experiences (i.e., *experience of competence and perceived instructional quality)* and discourse elements in lesson conferences (*i.e., co-constructive planning and student teacher orientation)* predict state STSE?

6. Methods

6.1. Sample

The sample consisted of 120 student teachers (M_{Age} = 28.34, SD_{Age} = 7.95, 71.7% females) from 72 Swiss secondary schools (rural, suburban & metropolitan areas). Student teachers were enrolled in a teacher education program and were completing an obligatory teaching practicum. During the teaching practicum student teachers were assigned to one school and participated in the everyday school life for at least three-weeks, acquiring teaching experiences under the supervision of a school-based cooperating teacher. For reasons of comparability, only student teachers who completed a teaching practicum in the subject of German participated. Student teachers were asked to complete a teaching unit consisting of six lessons on "written argumentation" in German lessons in one 7th to 10th grade class (N_{pupils} = 2,364, M_{Age} = 14.81, SD_{Age} = 1.21, 54.2% female). Of the student teachers, 61.5% reported that they had already completed a teaching practicum in the subject German before participating in this study. Nevertheless, 76.9% of the student teachers in the current sample indicated that they had no experience teaching the subject of "written argumentation".

6.2. Data collection

During the teaching unit, student teachers reported three times immediately after teaching a lesson via paper-pencil questionnaires on their state STSE focusing on learning support and lesson planning in the subject domain German (e.g., Tschannen-Moran & Hoy, 2001). Additionally, student teachers rated their perceived mastery experiences and discourse elements in lesson conferences with their cooperating teacher. For an overview of the exact item wordings see Appendix A, B and C. The internal consistency for each assessed scale is listed in Tables 1 and 2.

6.3. Measures

State STSE. State STSE was assessed immediately after a taught lesson using two scales. The first was *state STSE in learning* support (7 items; e.g., "How confident are you after this German lesson in implementing alternative strategies in your classroom?"), which was adapted from the self-efficacy for instructional strategies subscale from the shortened version of the Teachers Sense of Efficacy Scale (Tschannen-Moran and Hoy (2001). Three self-developed items were added to the subscale (e.g., "How confident are you after this German lesson in providing explanations and examples that support the understanding of the content?"). Additionally, we developed a new scale named *state STSE in lesson planning* (4 items; e.g., "How confident are you after this German lesson in adapting the aspiration level of teaching to the knowledge and skills of the pupils?"). Participants responded on a 5-point Likert scale from 1 (*not at all confident*) to 5 (*extremely confident*). Because we added items to an existing scale and developed a new scale, we conducted a component factor-analysis with varimax rotation using SPSS. The analysis revealed a two-factor structure with eigenvalues greater than 1 (state1:4.87, 1.37; state2: 5.45, 1.12; state3: 5.26, 1.57) for each of the three measurement occasions during the teaching practicum. The first component, *state STSE in lesson planning,* explained 44.25%, 49.55% and 47.80% of the variance, respectively and the second component, *state STSE inlearning support,* accounted for 12.48%, 10.22% and 14.30% of the variance, respectively. Furthermore, the investigation of the scree plot showed that a two-factor solution was appropriate.

Mastery experiences. Student teachers' lesson-related (state) mastery experiences during the teaching unit were operationalized with scales on perceived experience of competence and instructional quality. Immediately following a lesson, student teachers indicated how successful they perceived their teaching to be on a two-item *experience of competence* scale (e.g., "In this German lesson, I was satisfied with my own performance.") with anchors from 1 (*not at all*) to 5 (*exactly*). Additionally, student teachers reported their perceived lesson-related mastery experiences using scales on instructional quality. Three basic aspects of instructional quality were assessed immediately after a taught lesson with adapted scales from previous research projects (i.e., TIMMS, see e.g., Wendt et al. (2016); and COACTIV, see e.g., Kunter, Kleickmann, Klusmann, and Richter (2011)): *Disruptive classroom behavior* (2 items; e.g., "In this German lesson, it took a long time until pupils were ready to work."), *cognitive activation* (5 items; e.g., "In this German lesson, I encouraged the students to formulate their own (counter-) arguments."), and *individual learning* support (2 items; e.g., "In this German lesson, I took care of the students when they had problems."). All items were measured on a 5-point Likert scale from 1 (*strongly disagree*) to 5 (*strongly agree*).

Discourse elements in lesson conferences. Student teachers' lesson-related perceptions of their collaboration with the cooperating teacher in lesson conferences were assessed using two scales (see e.g., Staub et al., 2014): *co-constructive planning* (6 items; e.g., "In this lesson conference, my cooperating teacher and I discussed different methods of teaching.") and *student teacher orientation* (i.e., can a student teacher actively introduce topics which are discussed in lesson conferences; 5 items; e.g., "In this lesson conference, my cooperating teacher and I primarily discussed the questions, concerns and needs I had formulated."). Student teachers indicated their agreement on a 5-point Likert scale from 1 (*not at all*) to 5 (*exactly)*.

Table 1
Descriptive statistics and values for internal consistency for student teachers' state self-efficacy.

	State $_1$				State $_2$				State $_3$			
	N	*M*	*SD*	α	*N*	*M*	*SD*	α	*N*	*M*	*SD*	α
State STSE in learning support	89	3.80	0.58	.821	84	3.82	0.67	.851	82	3.95	0.65	.853
State STSE in lesson planning	93	3.79	0.62	.814	87	3.94	0.63	.828	85	4.10	0.62	.848

Note. STSE = Student teachers' self-efficacy; *N* = sample size; *M* = Mean; *SD* = Standard deviation; α = Cronbach's Alpha. Scores range from 1 to 5; the higher the score, the greater the perceived STSE.

Table 2
Descriptive statistics and values for internal consistency for measures related to mastery experiences and discourse elements in lesson conferences.

	State $_1$				State $_2$				State $_3$			
	N	*M*	*SD*	α	*N*	*M*	*SD*	α	*N*	*M*	*SD*	α
Mastery experiences												
Experience of competence	107	3.79	0.61	.617	110	3.85	0.79	.796	106	3.97	0.75	.770
Disruptive classroom behavior	109	1.97	0.71	.575	110	1.93	0.69	.691	108	2.04	0.79	.670
Individual learning support	109	4.39	0.67	.735	110	4.42	0.63	.836	108	4.93	0.76	.859
Cognitive activation	109	3.70	0.87	.655	110	3.93	0.83	.655	108	4.05	0.85	.734
Discourse elements in lesson conferences												
Co-constructive planning	93	3.98	0.89	.843	83	4.00	0.73	.785	79	3.98	0.73	.698
Student teacher orientation	77	4.07	0.62	.687	76	3.40	0.81	.858	67	4.09	0.64	.707

Note. *N* = sample size; *M* = Mean; *SD* = Standard deviation; α = Cronbach's Alpha; Scores range from 1 to 5; the higher the score, the greater the perceived experience of competence, instructional quality and quality of dialogue. Exception for classroom management: the higher the score, the greater the perceived disruptions in class.

6.4. Data analysis

We used hierarchical linear modeling (HLM; Raudenbush, Bryk, Cheong, & Congdon, 2001) to take the nested data structure (repeated measures on level 1, nested within student teachers on level 2) into account. We specified "intercept only models" (unconditional models) for both state STSE scales as these models provide estimates of the amount of variance at each hierarchical level. We then calculated intraclass coefficients (*ICC*) to report the proportion of variance that lies between persons and within persons. Using the *ICC*, we further calculated a design effect (*DEFF*)[2] to test the need for considering the multi-level structure (Maas & Hox, 2005; Peugh, 2010).

To investigate if there were linear changes in state STSE over the course of the teaching unit, "time" (first, second or third measurement) was added as a predictor in a random-intercept regression model. The same procedure was used to analyze the extent to which state STSE is associated with student teacher's lesson-specific reports (mastery experiences and discourse elements in lesson conferences). Thereby, predictor variables were group-mean centered to test for intra-individual relations and separate models were calculated for each form of state STSE (lesson planning, learning support). Following Nezlek (2001, 2012), this procedure is conceptually equivalent to estimating a regression coefficient for each student teacher (see Appendix E and D). The improvement of a model with an additional predictor on level 1 was calculated by comparing the difference of the deviance values of any two nested models. The deviance can be considered as a measure of how appropriate the model is to predict the dependent variable (state STSE). Using HLM, the deviance statistics were calculated from the -2-fold log-likelihood function (−2*log-likelihood). The difference between two nested models was tested for significance using a chi-square difference test, and thus can be used as a measure of model fit (Garson, 2012).

[2] A significant effect of cluster homogeneity is assumed when the design effect (DEFF) is $\geq$ 2.0 and is calculated by 1 - (average cluster size - 1) x ICC (Kish, 1965).

7. Results

7.1. Descriptive statistics

Means, standard deviations and scale reliabilities for student teachers' *state* STSE are included in Table 1. As can be seen, the means for both state STSE dimensions were above the scale midpoint, which indicates that the student teachers assessed their *state STSE in learning* support and *state STSE in lesson planning* in the subject domain German during the teaching unit as quite high. Table 2 shows means, standard deviations and scale reliabilities for situation-related perceived mastery experiences (*experience of competence* and perceived instructional quality, that is *disruptive classroom behavior, individual learning* support and *cognitive activation*) and lesson-related perceived collaboration with the cooperating teacher in lesson conferences *(co-constructive planning* and *student teacher orientation*) during the teaching unit. Comparable to the descriptive statistics in state STSE, the mean values for *experience of competence, individual learning* support and *cognitive activation* were all above the scale midpoints and below for *disruptive classroom management* (note: the smaller the value, the lower the perceived disturbance in the classroom). The same applies to *co-constructive planning* and *student teacher orientation* as indicators of the perception of the discourse elements in lesson conferences conducted with the cooperating teachers. Within- and between-person correlations among the study variables are outlined in Table 3.

7.2. Development of state STSE

To investigate student teacher's intra-individual development in their state STSE over the course of the teaching unit (research question 1), we entered *time,* (first, second or third measurement) on level 1 as a group-mean centered predictor. Results from hierarchical linear modeling showed an increase in model fit by entering *time* on level 1 for both state STSE dimensions. The regression coefficients for *time* (*state STSE in learning* support: $\gamma_{10} = 0.085$, $t\,(100) = 3.24$, $p = .002$; *state STSE in lesson planning*: $\gamma_{10} = 0.149$, $t\,(100) = 4.98$, $p \leq .001$) were rather small but

Table 3
Within- and between-person correlations of the study variables.

	1	2	3	4	5	6	7	8
1. State STSE in learning support		.627***	0.465***	−0.248**	0.249*	0.172*	0.065	0.176
2. State STSE in lesson planning	0.734**		0.440***	−0.234**	0.204*	0.119	0.031	0.236*
3. Experience of competence	0.526**	0.666**		−0.346***	0.277**	0.201**	0.033	0.118
4. Disruptive classroom behavior	−0.244*	-.0366***	−0.327**		−0.224**	−0.048	−0.074	−0.029
5. Individual learning support	0.299**	0.324**	0.341**	−0.239**		0.286***	0.096	0.037
6. Cognitive activation	0.117**	0.240*	0.184*	−0.065	0.364**		0.165*	0.015
7. Co-constructive planning	−0.004	0.085*	0.013	−0.169	0.058	0.258**		0.156
8. Student teacher orientation	0.151	0.051	0.042	0.056	−0.003	0.080	0.155	

Note. STSE = student teachers' self-efficacy. Correlations above the diagonal are within student teachers and correlations below the diagonal are between student teachers. Repeated measures were aggregated to the student teacher level to report between-person correlations.
*p ≤ .05; **p ≤ .01; ***p ≤ .001.

significant, indicating a positive linear intra-individual development for both state STSE scales over the course of the teaching unit. However, the graphs plotting each student teacher's individual development over the three assessments (see Appendix D for *state STSE in individual learning* support and Appendix E for *state STSE in lesson planning*), indicate that there were substantial differences between teachers and the development was not positively linear for all student teachers (see Fig. 1). There were also student teachers with negative trends and student teachers whose state STSE levels increased and decreased across time.

7.3. Intra-individual variance in state STSE

To examine if the detected inter-individual differences in student teachers' state self-efficacy development were in fact relevant (research question 2), we calculated ICCs and DEFFs using unconditional models in hierarchical linear modeling. The ICCs (*state STSE in learning* support: 0.70, $p < .001$; *state STSE in lesson planning*: 0.60, $p < .001$) as well as the DEFFs (*state STSE in learning* support: 2.16; *state STSE in lesson planning*: 2.00) demonstrated the need for multilevel modeling (Maas & Hox, 2005) and supported our hypothesis that state STSE fluctuated considerably within persons, that is there are lesson-specific fluctuations over the course of the teaching unit, which leads to the question of how these lesson to lesson fluctuations can be explained.

7.4. State STSE predicted by mastery experiences

Results from multilevel analysis predicting state STSE showed an increase in model fit by entering the different measures for lesson-related mastery experiences on level 1 (see Table 4 for *state STSE in learning* support and Table 5 for *state STSE in lesson planning*, columns Model 1a-1d). Thereby, regression coefficients for *experience of competence* indicated a significant positive relation with *state STSE in learning* support ($\gamma_{10} = 0.10$, $t\,(100) = 2.70$, $p = .008$) and *state STSE in lesson planning* ($\gamma_{10} = 0.18$, $t\,(100) = 3.44$, $p < .001$). The regression coefficients for all three dimensions of perceived *instructional quality* were in the expected direction but did not significantly predict state STSE. However, *cognitive activation* showed a tendency for a meaningful relation to *state STSE in lesson planning* ($\gamma_{40} = 0.10$, $t\,(100) = 1.95$, $p = .055$).

7.5. State STSE predicted by discourse elements from lesson conferences with the cooperating teacher

Results from multilevel analysis showed an increase in model fit by entering variables related to discourse elements in lesson conferences with the cooperating teacher on level 1 (see Table 6 and 7, columns Model 1a-1b). However, regarding *state STSE in learning* support the regression coefficients for *student teacher orientation* ($\gamma_{20} = 0.15$, $t\,(85) = 1.66$, $p = .100$) and for *co-constructive planning* ($\gamma_{10} = 0.00$, $t\,(95) = 0.03$, $p = .976$) did not reach a 5% significant level. For *state STSE in lesson planning* results showed a highly significant regression coefficient for *student teacher orientation* ($\gamma_{20} = 0.30$, $t\,(85) = 3.78$, $p < .001$). The regression coefficient for *co-constructive planning* ($\gamma_{10} = 0.086$, $t\,(95) = 1.900$, $p = .061$) was small and not statistically significant.

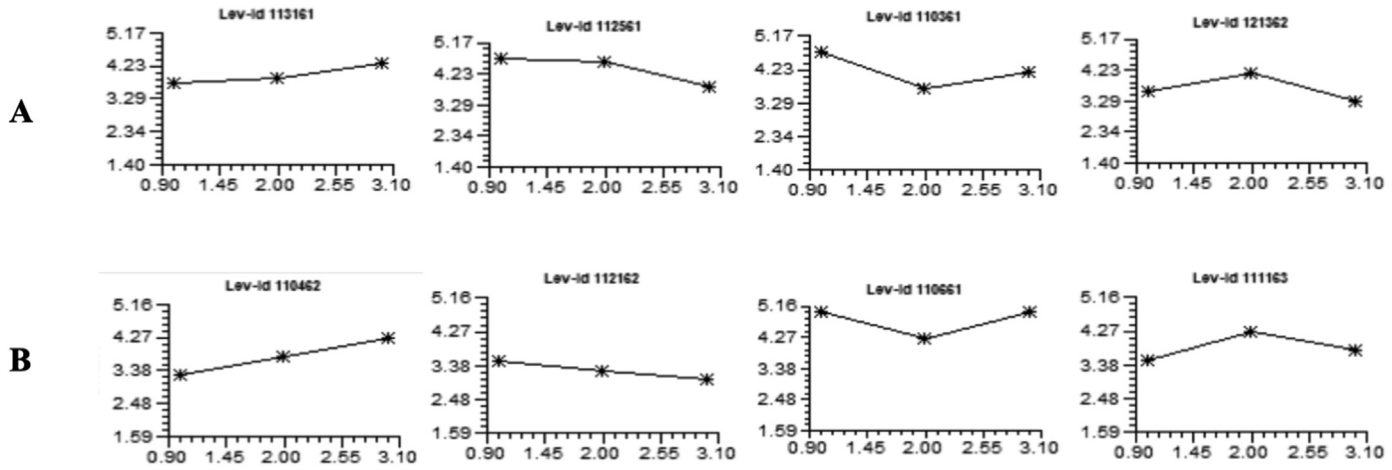


Fig. 1. Examples of graphs illustrating student teacher's individual development in their state self-efficacy (STSE) over the course of the teaching practicum. (A) State STSE in learning support. (B) State STSE in lesson planning.

Table 4
HLM results: Student teacher state self-efficacy in learning support predicted by mastery experiences.

	Model 0 (L1: $n = 269$; L2: $n = 101$)			Model 1a (L1: $n = 264$; L2: $n = 101$)				Model 1b (L1: $n = 265$; L2: $n = 101$)				Model 1c (L1: $n = 265$; L2: $n = 101$)				Model 1d (L1: $n = 265$; L2: $n = 101$)			
	β_{0j}	*SE*	*p*	β_{0j}	*SE*	*T*	*p*	β_{0j}	*SE*	*t*	*p*	β_{0j}	*SE*	*t*	*p*	β_{0j}	*SE*	*t*	*p*
Level 1																			
Intercept	3.85	0.06	<.001	3.85	0.06	69.07	<.001	3.84	0.06	68.23	<.001	3.98	0.04	68.29	<.001	3.98	0.04	68.35	<.001
Experience of competence (γ10)				0.10	0.04	2.70	0.008												
Disruptive classroom behavior (γ20)								- 0.03	0.04	- 0.58	0.561								
Individual learning support (γ30)												0.10	0.06	1.73	0.087				
Cognitive activation (γ40)																0.08	0.05	1.73	0.088
Random Effects																			
Level-1 (σ^2)	0.11965			0.10736				0.11557				0.10718				0.09550			
Level-2 (τ^2)	0.27566			0.27122				0.27511				0.27797				0.28213			
$ICC_{(1)}$	0.6973																		
DEFF	2.16																		
Deviance -2x log	390.50			367.89				383.89				379.15				376.87			
Difference Δ-2x log				22.61		<.001		6.61		0.036		11.35		0.004		13.64		0.001	

Note. The intercept in Model 0 to Model 1d refers to student teacher self-efficacy (STSE) in learning support. $ICC_{(1)}$ was calculated with Intercept-Only Model (Model 0: $STSEy_{ti} = \beta_{0j} + e_{0j}$): $ICC_{(1)} = \tau^2(\tau^2 + \sigma^2)$; it gives the percentage of variance that is attributable to differences between persons (τ^2 = variance between persons; σ^2 = variance between measurement occasions). DEFF = Design effect. Experience of competence, disruptive classroom behavior, individual learning support and cognitive activation were entered separately and group-mean centered predictors ($STSE_{ti} = \beta_{0j} + \beta_{1j}$* (Predictor) + e_{0j}). Varying sample sizes are due to missing data.

Table 5
HLM results: Student teacher state self-efficacy in lesson planning predicted by mastery experiences.

	Model 0 (L1: $n = 269$; L2: $n = 101$)			Model 1a (L1: $n = 264$; L2: $n = 101$)				Model 1b (L1: $n = 265$; L2: $n = 101$)				Model 1c (L1: $n = 265$; L2: $n = 101$)				Model 1d (L1: $n = 265$; L2: $n = 101$)			
	β_{0j}	*SE*	*p*	β_{0j}	*SE*	*t*	*p*	β_{0j}	*SE*	*t*	*p*	β_{0j}	*SE*	*t*	*p*	β_{0j}	*SE*	*t*	*p*
Level 1																			
Intercept	3.91	0.05	<.001	3.92	0.05	71.33	<.001	3.92	0.06	72.29	<.001	3.92	0.06	72.27	<.001	3.92	0.06	72.30	<.001
Experience of competence (γ10)				0.18	0.05	3.44	<.001												
Disruptive classroom behavior (γ20)								- 0.10	0.07	- 1.68	0.096								
Individual learning support (γ30)												0.03	0.07	0.46	0.647				
Cognitive activation (γ40)																0.10	0.05	1.95	0.055
Random Effects																			
Level-1 (σ^2)	0.15759			0.28213				0.12635				0.13263				0.12459			
Level-2 (τ^2)	0.23686			0.09550				0.24765				0.24528				0.24824			
$ICC_{(1)}$	0.6005																		
DEFF	2.00																		
Deviance -2x log	429.31			412.01				414.64				418.19				416.48			
Difference Δ-2x log				17.30		0 .001		14.67		<.001		11.12		0.004		12.83			0.002

Note. The intercept in Model 0 to Model 2c refers to student teacher self-efficacy (STSE) in lesson planning. $ICC_{(1)}$ was calculated with Intercept-Only Model (Model 0: $STSEy_{ti} = \beta_{0j} + e_{0j}$): $ICC_{(1)} = \tau^2(\tau^2 + \sigma^2)$; it gives the percentage of variance that is attributable to differences between persons (τ^2 = variance between persons; σ^2 = variance between measurement occasions). DEFF = Design effect. Experience of competence, disruptive classroom behavior, individual learning support and cognitive activation were entered separately and group-mean centered ($STSE_{ti} = \beta_{0j} + \beta_{1j}$* (Predictor) + e_{0j}). Varying sample sizes are due to missing data.

8. Discussion

This study analyzed student teacher's intra-individual development of state STSE during a 3-week teaching practicum on the topic "written argumentation" in the subject domain German. For this purpose, we investigated the development of state STSE with the help of repeated state measurements during a six-lesson teaching unit. Multi-level analyses showed a significant intra-individual increase over the course of the teaching practicum. However, our analyses further showed that a substantial amount of variance in state STSE during the teaching practicum was attributable to the situation (30% for *state STSE in learning* support and 40% for *state STSE in lesson planning*), which points to fluctuations within student teachers from lesson to lesson. To further investigate these situational fluctuations of state STSE, we included perceived lesson-related mastery experiences (through teaching experiences) and discourse elements in lesson conferences with the cooperating teacher (through lesson conferences) as potential situation-related sources that may positively affect student teachers' state STSE. The present study demonstrated that situational fluctuations within state STSE during the teaching practicum were mostly predicted by experiences of competence and partly by perceived student teacher orientation as a discourse element in lesson conferences with the cooperating teacher.

8.1. State STSE

Our multi-level analysis regarding student teachers' linear changes in their state STSE during the teaching practicum corroborates previous findings regarding inter-individual differences revealed through pre-post designs (e.g., Fives et al., 2007; Klassen & Durksen, 2014). In this study, student teachers' field placement strengthened student teachers' beliefs in their ability to support pupils learning and plan lessons. Although, our results show that state STSE during the teaching practicum is to a large extent person-specific (which means that it is influenced by person-specific

Table 6
HLM results: Student teacher state self-efficacy in learning support predicted by discourse elements in lesson conferences.

	Model 0 (L1: $n = 269$; L2: $n = 101$)			Model 1a (L1: $n = 240$; L2: $n = 96$)				Model 1b (L1: $n = 205$; L2: $n = 86$)			
	β_{0j}	*SE*	*p*	β_{0j}	*SE*	*t*	*p*	β_{0j}	*SE*	*t*	*p*
Level 1											
Intercept	3.85	0.06	<.001	3.83	0.06	66.13	<.001	3.81	0.06	62.12	<.001
Co-constructive planning (γ10)				0.00	0.05	0.03	0.976				
Student teacher orientation (γ20)								0.15	0.09	1.66	0.100
Random Effects											
Level-1 (σ^2)	0.11965			0.20460				0.15975			
Level-2 (τ^2)	0.27566			0.27137				0.11665			
$ICC_{(1)}$	0.6973										
DEFF	2.16										
Deviance -2x log	390.50			357.43				309.68			
Difference Δ-2x log				33.07			<.001	80.82			<.001

Note. The intercept in Model 0 to Model 1b refers to student teacher self-efficacy (STSE) in learning support. $ICC_{(1)}$ was calculated with Intercept-Only Model (Model 0: $STSEy_{ti} = \beta_{0j} + e_{0j}$): $ICC_{(1)} = \tau^2/(\tau^2 + \sigma^2)$; it gives the percentage of variance that is attributable to differences between persons (τ^2 = variance between persons; σ^2 = variance between measurement occasions). DEFF = Design effect. Co-constructive planning and student teacher orientation were entered separately and group-mean centered ($STSE_{ti} = \beta_{0j} + \beta_{1j}$* (Predictor) + e_{0j}). Varying sample sizes are due to missing data and the fact, that some student teachers did not take part in any lesson conferences during the teaching unit.

Table 7
HLM results: Student teacher state self-efficacy in lesson planning predicted by discourse elements in lesson conferences.

	Model 0 (L1: $n = 269$; L2: $n = 101$)			Model 1a (L1: $n = 240$; L2: $n = 96$)				Model 1b (L1: $n = 205$; L2: $n = 86$)			
	β_{0j}	*SE*	*p*	β_{0j}	*SE*	*t*	*p*	β_{0j}	*SE*	*t*	*p*
Fixed Effects											
Level 1											
Intercept	3.93	0.05	<.001	3.91	0.06	68.90	<.001	3.89	0.06	66.23	<.001
Co-constructive planning (γ10)				0.09	0.05	1.90	0.061				
Student teacher orientation (γ20)								0.20	0.07	2.78	<.007
Random Effects											
Level-1 (σ^2)	0.15759			0.16100				0.15759			
Level-2 (τ^2)	0.23686			0.24115				0.23686			
$ICC_{(1)}$	0.6005										
DEFF	2.00										
Deviance -2x log	429.31			395.25				326.48			
Difference Δ-2x log				34.06			<.001	102.83			<.001

Note. The intercept in Model 0 to Model 1b refers to student teacher self-efficacy (STSE) in lesson planning. $ICC_{(1)}$ was calculated with Intercept-Only Model (Model 0: $STSEy_{ti} = \beta_{0j} + e_{0j}$): $ICC_{(1)} = \tau^2/(\tau^2 + \sigma^2)$; it gives the percentage of variance that is attributable to differences between persons (τ^2 = variance between persons; σ^2 = variance between measurement occasions). DEFF = Design effect.Co-constructive planning and student teacher orientation were entered separately and group-mean centered ($STSE_{ti} = \beta_{0j} + \beta_{1j}$* (Predictor) + e_{0j}). Varying sample sizes are due to missing data and the fact, that some student teachers did not take part in any lesson conferences during the teaching unit.

factors such as personality, pedagogical content knowledge, teaching experiences and various other factors), a considerable amount of variance in state STSE was located within student teachers (30% for STSE in learning support and 40% for STSE in lesson planning).

Our results are in line with research regarding the intra-individual variability of TSE in in-service teachers (e.g., Malmberg, Lim, Tolvanen, & Nurmi, 2016; Ross et al., 1996) and extend it to a sample with student teachers during a teaching practicum. The results of our study supported the hypothesis that there are student teachers who showed “ups and downs” in state STSE over the course of the teaching practicum and that a positively perceived teaching experience during the teaching practicum (e.g., perceived mastery experiences and student teacher orientation in lesson conferences) temporally leads to an increase in student teachers state STSE. As a consequence, these findings indicate that it is not sufficient to only look at linear developmental trends over the course of the teaching practicum. Since the teaching practicum is a crucial developmental phase for student teachers, it is therefore essential to consider situation-specific fluctuations, as it allows identifying situation-specific sources that can explain state STSE estimates. Hence, the occurrence of intra-individual variability in state STSE highlights the need for future research designs with repeated lesson-related measures in order to investigate intra-individual learning trajectories and situation-specific fluctuations in state STSE from lesson to lesson (e.g., Schmitz, 2006; Yeo & Neal, 2006).

8.2. Intra-individual variability in state STSE predicted by mastery experiences

Given the intra-individual variability in student teachers’ state STSE over the course of the teaching unit, this study investigated several potential sources of state STSE during the teaching practicum. Thereby, multilevel analyses showed that intra-individual variations in state STSE in learning support and lesson planning can partly be explained by experiences of competence. Feeling satisfied and in control after a taught lesson was positively related to state STSE during the teaching practicum. These results are in line with previous findings regarding student teachers (e.g., Pfitzner-Eden, 2016) and in-service teachers (e.g., Tschannen-Moran & Hoy, 2007), which support the relevance of mastery experiences in developing (student) teachers’ self-efficacy during the teaching practicum. State STSE in learning support as well as state

STSE in lesson planning were not significantly explained by single self-perceived dimensions of instructional quality (disruptive classroom behavior, individual learning support or cognitive activation). Despite our limited sample size which may hinder the detection of small but meaningful relations, there was a positive tendency between perceived cognitive activation during a lesson and student teachers state STSE in lesson planning. One explanation may be, that achieving instructions that are cognitively activating for pupils requires various actions when planning a lesson, such as adapting the aspiration level of teaching to the knowledge and skills of the pupils (Burn, Hagger, Mutton, & Everton, 2000; König, Bremerich-Vos, Buchholtz, & Glutsch, 2020). Our specific focus on state STSE in lesson planning might explain the differences to findings from Holzberger et al. (2013), who did not find cognitive activation to be a significant predictor for in-service TSE in a one year longitudinal study.

8.3. Intra-individual variability in state STSE predicted by discourse elements in lesson conferences

Results from the present study showed that student teacher orientation in lesson conferences with the cooperating teacher predicted intra-individual variation in state STSE in lesson planning. This means, by adopting a learner-orientation that considers student teachers' individual needs (Schunk & Usher, 2019), cooperating teachers can support student teachers in gaining more confidence in their own abilities regarding lesson planning. Cooperating teachers who allow student teachers to actively introduce topics and shape the course of the dialogue in lesson conferences enable the student teachers to take an active role. This discourse element is somewhat related to verbal persuasion, as cooperating teachers demonstrate trust in student teachers' abilities to consider relevant issues in the planning stage of a lesson. Student teachers can participate in shaping the content of a lesson conference and consequently the lesson design and main objectives of the lesson. The relevance of a learner-orientation in lesson conferences can further be supported by research that indicates that more learning occurs in moments in which a cooperating teacher allows the student teachers to introduce the topics to be discussed (Futter & Staub, 2017; Mena, Hennissen, & Loughran, 2017). The results of the present study indicate that encouraging behavior by cooperating teachers is not limited to "pep talks" (Tschannen-Moran et al., 1998) but extends to supporting student teachers in planning and reflecting on their teaching performances.

Our study revealed somewhat weaker, non-significant relations to state STSE and co-constructive planning in lesson conferences, even though co-planning and co-teaching are proposed in various coaching models for the teaching practicum (Murphy, Scantlebury, & Milne, 2015; West & Staub, 2003). The results were somewhat surprising since Kreis and Staub (2011) found that mutual responsibility especially in pre-lesson conferences supports student teachers' learning during the teaching practicum. In their quasi-experimental study, co-constructive dialogues were positively associated with the number of learning events reported by student teachers as well as with identified video-based conversation sequences referencing learning in terms of insights and changes in lesson conferences. Findings from Richter et al. (2013) additionally, supported that mentoring based on collaborative co-working during the teaching practicum is beneficial for the development of student teachers' sense of self-efficacy. Our deviating results on the relationship between cooperating teacher's assistance and state STSE may result from differing research methods, since the multilevel structure and the associated intra-individual variation over the course of the teaching practicum within the student teachers was not taken into account by previous studies.

Furthermore, the weaker relationship between co-constructive planning and state STSE in lesson planning compared to student teacher orientation could be because co-constructive collaboration can lead to shared responsibility for teaching performance, since both the student teacher and the cooperating teacher encounter situations where different teaching methods are possible (e.g., Staub et al., 2014). This shared responsibility may then lead student teachers to attribute their teaching successes and failures to not just their own abilities, which would then leave their state STSE largely uninfluenced. Considering that student teachers' appraisals of their teaching are influenced to a great extent by feedback from more experienced teachers (e.g., Tschannen-Moran & Hoy, 2007), the deviating results can also be explained by the fact that an initially positive assessment of student teachers' teaching performance is relativized by an experienced teacher putting student teacher's self-efficacy beliefs into perspective. This may especially occur if the cooperating teacher expresses doubts about student teachers' teaching performance and their capabilities (e.g., Kopcha & Alger, 2011). As a consequence, a positive relationship between the co-construction in lesson conferences and state STSE may be reduced or eliminated. This twofold role of cooperating teachers' verbal inputs regarding changes in STSE was also emphasized in a mixed-method study by Klassen and Durksen (2014).

In sum, situation-related fluctuations in state STSE can best be explained by lesson conferences with cooperating teachers that are learner-oriented. This means, that cooperating teachers can promote student teachers lesson-related self-efficacy beliefs by discussing aspects in lesson conferences that are introduced by and thus relevant for student teachers (e.g., Crasborn et al., 2011). This result is in line with previous research that demonstrated the beneficial effect of lesson conferences on student teachers' professional development during the teaching practicum (Futter & Staub, 2017; Mena et al., 2017). Our results further suggest, that cooperating teachers may hinder an increase in lesson-related state STSE beliefs over the course of the teaching practicum, for example, by questioning and criticizing the (planned) teaching performance of student teachers or contributing only their own ideas. The content of the discourse elements in lesson conferences could therefore mediate the relationship between mastery experiences and student teachers' self-efficacy. This is consistent with previous findings that mastery experiences gained during the teaching practicum are modified by the other three sources, such as verbal persuasion by the cooperating teacher (e.g., Pfitzner-Eden, 2016). Therefore, more research is needed to further explore the interplay between the content or intention of lesson conferences and the resulting appraisal of student teachers' teaching performance.

8.4. Strengths and limitations of the study

Using repeated state assessments this study demonstrated the need to capture student teachers' lesson-related self-efficacy with fine-grained state measures (Schmitz, 2006) during the teaching practicum and gives insight into the micro-processes of the intra-individual variability of state STSE and its relation to contextual and situational specific factors. With this procedure, this study was able to reveal fluctuations in state STSE over time. This supports the reciprocal character of (S)TSE assumed by Tschannen-Moran et al. (1998) whereby, (S)TSE can be regarded not only as a determining variable but also as a result of a learning process. Thus, future studies on STSE should include repeated state measures during the teaching practicum and simultaneously investigate situation specific factors to take their interaction into account. A further strength was the multilevel analysis that provided new insights into student teachers' intra-individual development over time, which could then be examined in association with situation-

specific factors.

Although, the present study investigated different sources of self-efficacy (e.g., perceived mastery experiences and collaboration with the cooperating teacher in lesson conferences), it was not possible to consider all of the sources mentioned in the previous literature. For example, in the context of this study we were not able to consider the situation-specific relationship between state STSE and vicarious experiences, such as job shadowing. Our data collection took place within a teaching practicum that was intended to provide student teachers with an opportunity to gain experience in teaching through their own teaching. All participating student teachers had to complete a teaching unit consisting of six lessons independently and only received support from their cooperating teacher before and after the lessons taught. Thus, job-shadowing or other forms of vicarious experiences were not an obligatory and comparable element in the teaching practicum we investigated. In addition, we also did not assess emotional arousal, which could have been another important source of state STSE (e.g., Hascher & Hagenauer, 2016; Hastings, 2004). In order to provide a comprehensive view of the situation-specific relationship between state STSE and various sources of self-efficacy during the teaching practicum, future research focusing on fluctuations in state STSE could also consider vicarious experiences and emotional arousal.

There are certain limitations regarding the present study that need to be discussed to adequately interpret the results. The study variables were measured only using self-reports and no data from the cooperating teachers or pupils taught were included in the analyses. This may increase the risk of a common method bias (e.g., Donaldson & Grant-Vallone, 2002; Podsakoff, MacKenzie, Lee, & Podsakoff, 2003; Tehseen, Ramayah, & Sajilan, 2017). As a result, the estimated impact may be biased if student teachers overstate both their self-efficacy beliefs and perceived mastery experiences due to the tendency to assess themselves in too positive manner or because of social desirability. However, self-efficacy is defined as an individual's belief about what one can do, and thus reflects the degree of difficulty individuals believe they can overcome (Bandura, 1977). According to this definition, STSE is a measure that corresponds to a private event (i.e., how student teachers perceive their ability to teach) and is therefore only suitable for self-reporting (Conway & Lance, 2010). This also applies to the assessment of variables related to satisfaction (e.g. experience of competence). In addition, the professional development of student teachers is usually process- and situation-oriented, and thus largely depends on how the student teachers interpret the learning context (Hascher, Cocard, & Moser, 2004). Taken together, we believe that STSE is best captured by self-reports even if empirical results based on self-reports suffer from a potential self-perception bias (e.g., Wubbels, Brekelmans, & Hooymayers, 1992).

Nevertheless, in order to minimize a common method bias, future research could obtain measures of predictor and criterion variables, such as quality of dialogue in lesson conferences, from different sources (i.e., cooperating teachers). This would allow a more reliable interpretation of the results (e.g., Kunter & Baumert, 2006; MacKenzie & Podsakoff, 2012). For instance, some participating cooperating teachers mentioned that some lesson conferences only took place when something went "wrong" and a more intense intervention seemed necessary. Such instances do not necessarily pertain to "verbal persuasion", that is they are not expected to increase STSE. Hence, future studies focusing on the relationship between verbal persuasion within lesson conferences and the development of STSE should ideally be conducted using quantitative as well as qualitative assessments, for example regarding possible reasons for conducting the lesson conferences. This would allow a differentiated examination of the content or aspects discussed, which student teachers integrate into their teaching repertoire (e.g., Klassen & Durksen, 2014).

Bandura (2006) as well as Schunk and Usher (2011) state that self-efficacy instruments should be as specific as necessary for the study. Thus, we added items to the subscale state STSE in learning support from the shortened version of the Teachers Sense of Efficacy Scale (Tschannen-Moran and Hoy (2001) and introduced a newly developed scale named state STSE in lesson planning. This was necessary to refer to the specific setting of the assessed teaching practicum in which student teachers focused on teaching the topic written argumentation and intensively worked with a cooperating teacher in the planning stage of a lesson. It can be assumed that the items we used to investigate state STSE during the teaching practicum are conceptually more accurate than a more global measure of STSE assessed before and after the teaching practicum (e.g., Chesnut & Burley, 2015; Dellinger et al., 2008). However, to counteract possible confusion with other constructs such as self-esteem or self-concept or to increase the accuracy of measured state (S)TSE, future studies could focus on a mixed-methods triangulation, for example by using semi-structured interviews after student teachers fill in questionnaires in order to assess student teachers' underlying cognitions and interpretations (Bong, 2002; Wyatt, 2014).

9. Conclusion

This research provides an insight into the development of state STSE over the course of a three-week teaching practicum. Overall, the results indicated a positive relationship between the teaching practicum and student teachers' state self-efficacy. Despite this positive relationship, multilevel analysis also revealed differences in student teachers' intra-individual development, with some student teachers showing linear positive changes and others showing "ups and downs" over the course of the teaching practicum, indicating situational fluctuations from lesson to lesson. These situational fluctuations within student teachers' state self-efficacy on the dimensions learning support and lesson planning can partly be explained by mastery experiences (i.e., experiences of competence) and discourse elements from lesson conferences with a cooperating teacher (i.e., student teacher orientation).

The present study therefore has the potential to improve the understanding of how STSE relates to situation-specific factors during the teaching practicum. Our results strengthen the assumptions discussed in previous literature concerning student teachers' field experiences, namley that cooperating teachers' support in lesson conferences should be less directive and focus on aspects introduced by student teachers. Therefore, trainings for cooperating teachers could focus on developing communication skills that enable them to strengthen the beliefs of STSE and integrate the questions and learning needs of student teachers into lesson conferences.

CRediT author statement

Rupp, D: Conceptualization, Investigation, Methodology, Formal analysis, Software, Validation, Data Curation, Writing - Original Draft, Visualization. Becker, E: Project administration, Validation, Supervision, Writing - Review & Editing.

Appendix A

Items of student teachers' state teacher self-efficacy.

How confident are you after this German lesson in …	
Scale	Item
State STSE in learning support	… providing an alternative explanation or example when pupils are confused? *
	… crafting good questions for your pupils? *
	… implementing alternative strategies in your classroom? *
	… ensuring that students are intensely talking about lesson contents?
	… providing explanations and examples that support the understanding of the content?
	… adjusting the level of difficulty of the lesson to students' knowledge and skills?
	… supporting students' individual learning needs (e.g. offer different forms of learning support)?
State STSE in lesson planning	… adapting the aspiration level of teaching to the knowledge and skills of the pupils?
	… integrating the lesson(s) with the teaching unit in a meaningful way?
	… focusing the lesson design on the main objectives of the lesson?
	… formulating and clarifying the learning objectives of the lesson?

Notes: STSE = Student teachers' self-efficacy; * items according the shortened version of the Teachers Sense of Efficacy Scale (TSES) developed by Tschannen-Moran and Hoy (2001).

Appendix B

Items concerning experiences of competence and perceived instructional quality.

Scale	Item
	In this German lesson, …
Experience of competence	… I was satisfied with my own performance.
	… I experienced the feeling of having everything under control.
Disruptive classroom behavior	… it took a long time until the pupils were quiet and ready to work.
	… a lot of time was wasted during the lesson.
Individual learning support	… I took care of the pupils when they had problems.
	… I helped the pupils if they didn't know what to do at a task.
Cognitive activation	… I encouraged the pupils to formulate their own (counter-) arguments.
	… I asked the pupils to give precise reasons for their considerations.
	… I asked the pupils to write down their own positions.
	… I gave the pupils the time to discuss their own positions.

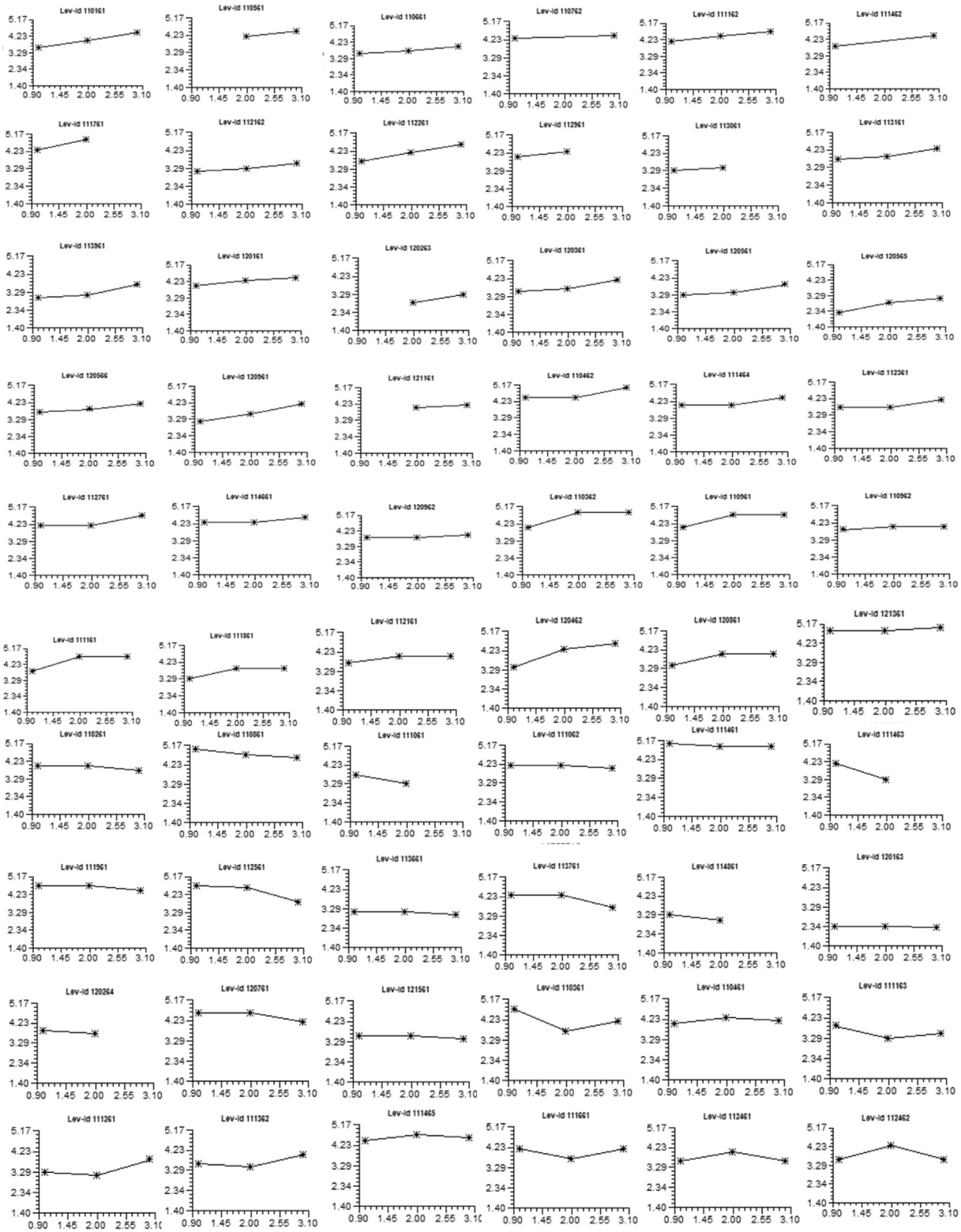
Appendix C

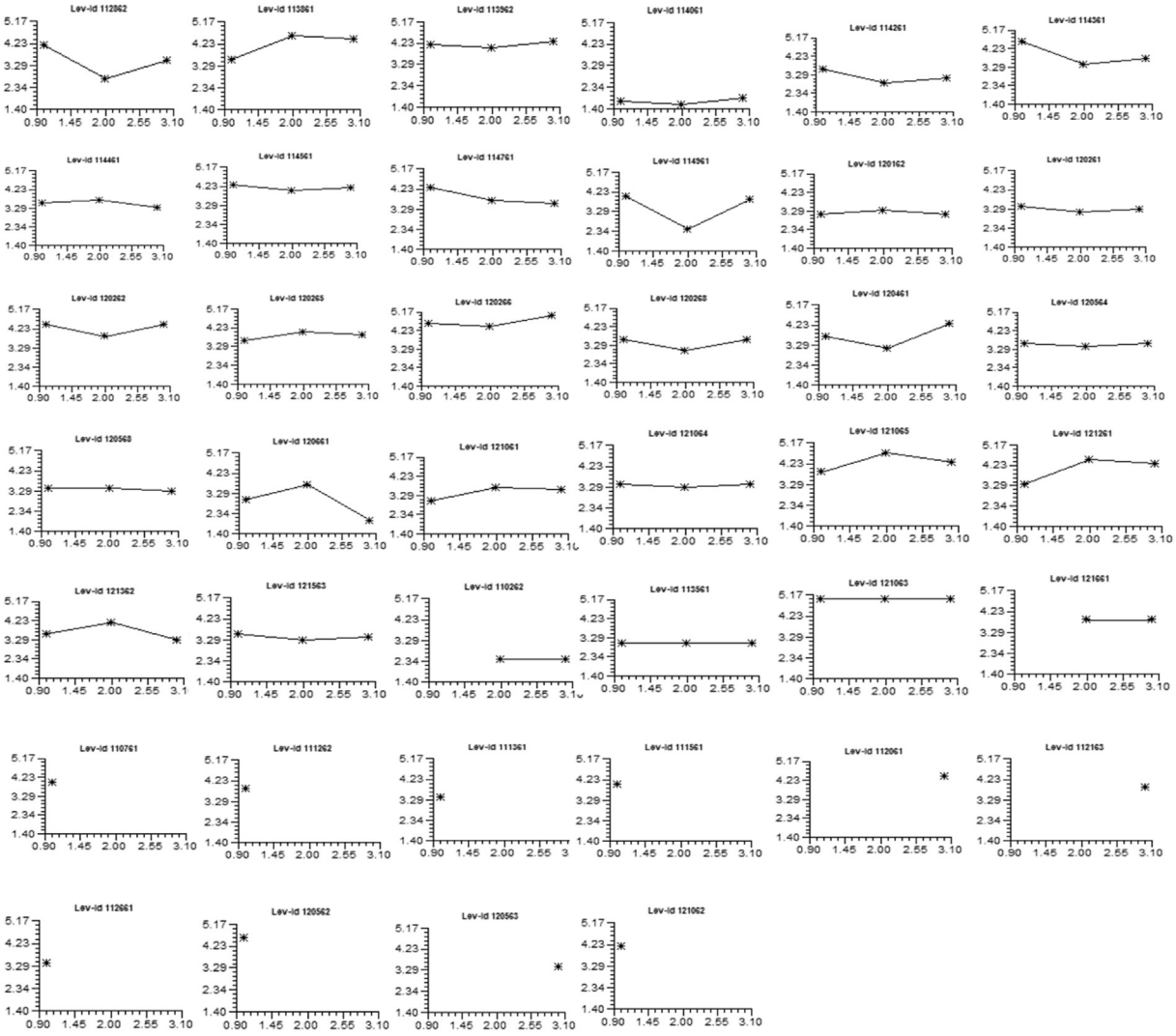
Items concerning discourse elements in lesson conferences conducted with the cooperating teacher.

Scale	Item
	In the lesson conference, …
Co-constructive planning	… my cooperating teacher made suggestions for lesson designs.
	… my cooperating teacher and I discussed different methods of teaching.
	… my cooperating teacher gave good arguments for his suggestions for improvement.
	… my cooperating teacher offered suggestions for improvement and different options for teaching.
	… my cooperating teacher and I modified and developed the lesson design together.
	… my cooperating teacher and I discussed still existing uncertainties concerning the lesson design.
Student teacher orientation	… my cooperating teacher and I primarily discussed concerns and needs I had expressed.
	… I was able to actively shape the course of the dialogue.
	… my cooperating teacher and I discussed different options of teaching.
	… I was able to contribute to the decision on which aspects I wanted to receive feedback.
	… my cooperating teacher encouraged me to actively bring uncertainties and open questions into the conversation.

Appendix D

Results for each student teacher's individual development in state STSE in individual learning support over three assessments.




Lev-id 112062
Lev-id 113061
Lev-id 113562
Lev-id 114061
Lev-id 114261
Lev-id 114361
Lev-id 114461
Lev-id 114561
Lev-id 114761
Lev-id 114961
Lev-id 120162
Lev-id 120261
Lev-id 120262
Lev-id 120265
Lev-id 120266
Lev-id 120268
Lev-id 120461
Lev-id 120564
Lev-id 120568
Lev-id 120661
Lev-id 121061
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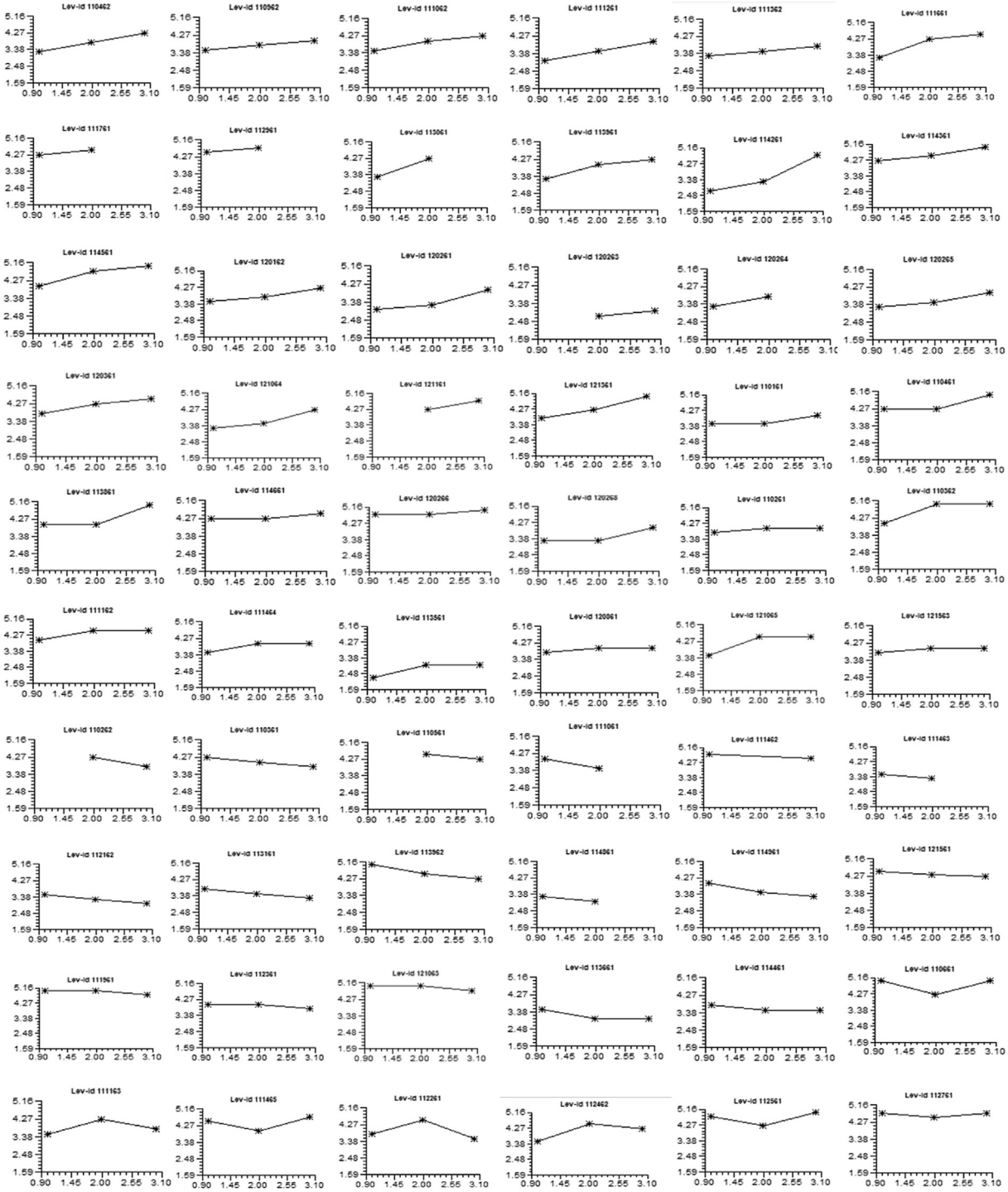
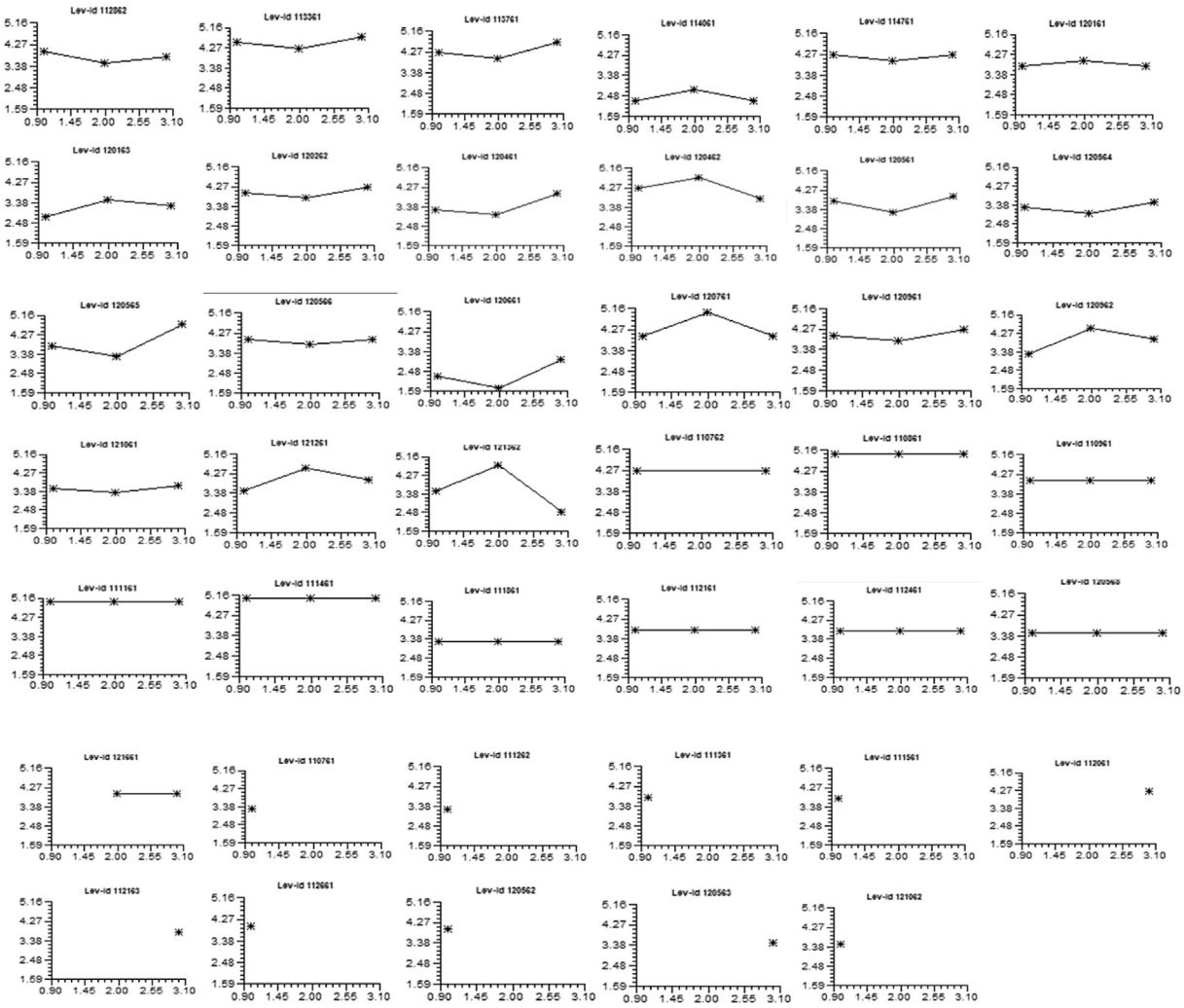
Lev-id 121065
Lev-id 121261
Lev-id 121362
Lev-id 121563
Lev-id 110262
Lev-id 113561
Lev-id 121063
Lev-id 121661
Lev-id 110761
Lev-id 111262
Lev-id 111361
Lev-id 111561
Lev-id 112061
Lev-id 112163
Lev-id 112661
Lev-id 120562
Lev-id 120563
Lev-id 121062
5.17
4.23
3.29
2.34
1.40
0.90 1.45 2.00 2.55 3.10

(***continued***).

Appendix E

Results for each student teacher's individual development in state STSE in lesson planning over three assessments.





(*continued*).

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